

perplex those who try to interpret the most active student of a group already sufficiently involved: *R. depavitus* Gent. Herb. v. 382, fig. 172 (1943) published with a beautiful plate showing a 5-foliolate primocane-leaf and glandular pedicels ("pedicelli longi, erecti, glandulosi"), but in vol. vii. 303, fig. 117 (1947) this species, *R. depavitus*, shown with 3 leaflets and glabrous pedicels, while the original plate, published as typical of *R. depavitus*, now appears as representing a new species with a highly suggestive name, *R. redundans*, l. c. 300, 302, fig. 116 (1947). Again, as "contrasted with *R. particeps* of Nova Scotia" there is presented "a picture of *R. alius*, Fig. 121" in Gent. Herb. vii. 308, 310, fig. 121 (1947), "a clear-cut species of Connecticut and Rhode Island", but the caption under the illustration calls it a "trailer in Nova Scotia". Checking back to the original account of *R. alius* in Gent. Herb. v. 400 (1943) one reads that it grows in "Massachusetts, Connecticut". It may be found in Rhode Island, but what about Nova Scotia, which in one item is indicated as its exclusive area? All of which suggests that, if one is to propose a "new species" for every clone, it would be safer not to cite two collections and to be sure that the illustrations are made from the actual types.

RUBUS CORDIFRONS Bailey, forma **pleniflorus**, f. nov., petalis numerosis, flore pleno.—NEW JERSEY: border of dry sandy thicket, 1 mile northeast of Fairview, Gloucester County, June 14, 1924, *Bayard Long*, no. 30,768 (TYPE in Herb. Phil. Acad.).

A beautiful and profusely floriferous double-flowered form, many of the stamens altered to petals, the flowers thus suggesting double-flowered small roses.

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## A STUDY OF ELYMUS IN MINNESOTA<sup>1</sup>

L. E. BOOHER AND R. M. TRYON, JR.

A preliminary study of *Elymus* in Minnesota revealed that the present treatments were not entirely satisfactory for our material and therefore a more extended study was undertaken. The present study has, of course, its limitations and problems are raised

<sup>1</sup> Contribution from the Herbarium of the University of Minnesota IX. Field work was supported, in part, by a grant-in-aid from the Graduate School of the University of Minnesota.

that only a monographic study can answer. In general, previous work has been accepted whenever possible to do so.

In measurements of the lengths of the spikes, glumes and lemmas awns, if present, were included unless otherwise stated. Detailed descriptions and measurements of floral parts apply to those taken from near the middle of the spike. The widths of glumes are given at their widest portion and flattened out. Measurements for lemmas, paleas, anthers and grains refer in all cases to those of the first florets. Measurements of all floral parts are based upon boiled material. All specimens cited are in the Herbarium of the University of Minnesota.

We are indebted to Mrs. Agnes Chase, Dr. J. R. Swallen and Dr. B. G. Schubert for information concerning certain specimens and to Dr. J. B. Moyle for information concerning the alkali areas in Minnesota.

- a. Lemma-awns, if present, ascending, sometimes somewhat spreading, straight or irregularly flexuous, not curved or recurved, mostly less than 2 cm. long. . . . b.
- b. Rachis continuous at maturity, not disarticulating, each spikelet disarticulating either above or just below the glumes. . . . c.
- c. Spikelets disarticulating below the glumes<sup>2</sup>, glumes long-lanceolate, distinctly widened above the base, more or less twisted. . . . d. (1. *E. virginicus*).
- d. Awns of the glumes 3–6 mm. long; awns of the lemmas 8–16 mm. long; spikes included or exerted. . . . e.
- e. Spikes included or barely exerted, green; upper surface of the leaves glabrate to scabrous. . 1a. *E. virginicus* (typical).
- e. Spikes well exerted, glaucous; upper surface of the leaves villous-hirsute. . . . 1d. *E. virginicus* var. *halophilus*.
- d. Awns of the glumes absent or up to 2 mm. long; awns of the lemmas 1–2.5 mm. long; spikes mostly exerted. . . . 1b. *E. virginicus* var. *submuticus*.
- c. Spikelets disarticulating above the glumes; glumes setaceous to subsetaceous, scarcely widened above the base, straight. . . . f.
- f. Lemma-awns more than 15 mm. long. . . . g. (2. *E. villosus*).
- g. Lemmas glabrate to hispid on the lower part of the body, hispid to villous on the upper part. . . . 2a. *E. villosus* (typical).
- g. Lemmas glabrate to puberulent on the lower part of the body, glabrate to short-hispid on the upper part. . . . 2b. *E. villosus* f. *arkansanus*.
- f. Lemma-awns less than 2 mm. long . . . . 6. *E. cinereus* (excluded species).
- b. Rachis disarticulating at maturity, at least in part; a spike-

<sup>2</sup> The place of articulation is easily determined in dried specimens, often even those collected in flower. When the spike or spikelet is broken apart by a teasing needle, it breaks at the same place it would normally disarticulate.

let or spikelet-pair at a node falling with a rachis joint

5. "*E. Macounii*" (*Agropyron trachycaulum* var. *typicum* × *Hordeum jubatum*).

- a. Lemma-awns ascending-spreading, many in a single spike curved-divergent or recurved, especially in fruit (straight only before flowering) 1.5–4 cm. long, mostly over 2.5 cm. long. . . . *h.*
- h.* Glumes equal, narrowly to long-lanceolate, distinctly widened above the base, distinctly 3–6 nerved, 14–35 mm., usually 25–30 mm., long. . . . 3. *E. canadensis.*
- h.* Glumes unequal, setaceous, not widened above the base, or subsetaceous or rarely narrowly lanceolate; not evidently nerved to scarcely 3-nerved
4. *E. canadensis* × *Hystrix patula.*

### 1. ELYMUS VIRGINICUS

1a. *E. VIRGINICUS* L. (TYPICAL). *E. striatus* Willd., not of most recent authors.—*Culms* erect; *sheaths* glabrous, commonly overlapping; *blades* flat, slightly scabrous on both surfaces and more so on the under surface and on the margins; *spikes* erect, stiff, with bristly ascending awns, often with 1 to 3 rudimentary spikelets below the inflorescence proper; *rachis-internodes* flattened, scabrous or strigose-haired along margins of upper third and with a few longer coarse hairs at the top; *spikelets* in pairs, 3- to 5-flowered (mostly 4-flowered), rigid and closely appressed against the floral axis; *glumes* stout, more or less twisted, stiff, terete and about one-half as broad at the nonstriate base as near the middle, bowed out, indurated and at maturity markedly yellowed at the base for about 2 mm., glabrous or scabrous to scabrous-hirsute on margins and nerves, with 3–5 strong nerves; awns straight and ascending, scabrous; *lemmas* rounded on the back, margins of upper half often narrowly hyaline, glabrate or scabrous to sparsely hispidulous toward the apex, glabrate below, 5-nerved near the apex, awns straight, ascending, stiff, scabrous; *paleas* blunt and ciliate at the apex and along the upper half of the strong keels at either side.

Dimensions of various organs (all measurements based on 16 specimens):

Culm-length. . . . .	40–80 cm.	Glume-width . . . . .	1.0–1.6 mm.
Culm-width. . . . .	0.1–0.3 cm.	Lemma-length . . . . .	1.5–2.4 cm.
Blade-length. . . . .	13–25 cm.	Length of lemma-body . . . . .	7.0–8.6 mm.
Blade-width. . . . .	0.3–1.0 cm.	Palea-length. . . . .	6.6–8.5 mm.
Spike-length. . . . .	4.5–15.5 cm.	Grain-length. . . . .	4.5–5.6 mm.
Glume-length. . . . .	12–20 mm.	Grain-width. . . . .	1.4–1.8 mm.

In addition to the sixteen specimens included in the above description, the Minnesota collection includes three unusually robust specimens. These three specimens are distinctive only in the size of the various parts which are from 5 to 25% larger than the corresponding organs of the other specimens.

Generally distributed in open woods, river bottoms and on river banks and lake shores.

1b. *E. VIRGINICUS* var. *SUBMUTICUS* Hooker.—Differs from the species proper in having subulate-tipped or very short-awned glumes (awns up to 2 mm. long) and lemmas (awns 1–2.5 mm. long) and in having exerted (up to 10 cm.) and/or included or barely exerted spikes. Among eight specimens collected within the state, only one specimen had included spikes exclusively; five had exerted spikes of which two had short-exerted and included spikes represented in the same specimens.

Distribution and habitat similar to that of the typical element of the species.

1c. Specimens intermediate between *E. VIRGINICUS* (TYPICAL) and *E. VIRGINICUS* var. *SUBMUTICUS*. *E. virginicus* f. *jejunus* Ramaley.

After careful examination of available specimens, including the type of *E. virginicus* f. *jejunus*, it is our belief that it and specimens corresponding to it are intermediates between typical *E. virginicus* and var. *submuticus*.

The following table shows the range of the critical characters:

<i>E. virginicus</i> (16 specimens)	<i>Proposed</i> <i>intermediate</i> <i>group</i> (5 specimens)	<i>E. virginicus</i> var. <i>submuticus</i> (8 specimens)
Length of lemma-awns 8–16 mm.	4–12 mm.	1–2.5 mm.
Length of glume-awns 3–6 mm.	Up to 5 mm. or merely subulate-tipped.	Up to 2 mm. or merely subulate-tipped.

SPECIMENS EXAMINED: MINNESOTA: Lake Benton, August 1891, *Sheldon 1375* (TYPE of *E. virginicus* f. *jejunus*); St. Louis River, July 23, 1886, *L. H. Bailey 265*; Gooseberry Falls, Lake Co., August 31, 1930, *Rosendahl 6390*; St. Vincent, August, 1900, *Ballard 2629*; Winona Co., July to October, 1897, *Holzinger 29* (UM Herb. 264292).

1d. *E. VIRGINICUS* var. *HALOPHILUS* (Bickn.) Wiegand.—*E. halophilus* Bickn.

Since this variety of *E. virginicus* apparently is not common and has seldom been described in detail, the description of the four specimens collected in Minnesota is given here. This variety differs from the typical species in having usually more flaccid and glaucous spikes, in general shorter paleas, usually less twisted glumes with pale yellow glume-bases, and glaucous leaf-blades which are pubescent on their upper surfaces.

*Culms* erect and slender; *sheaths* slightly shorter than the internodes, glabrous; *blades* glaucous, scabrous, villous-hirsute above; *spikes* glaucous, sometimes slightly nodding, usually several rudimentary spikelets at the base, peduncles slender, exerted 4–15 cm.; *rachis-internodes* 4–5 mm. long, hispid-ciliate; *spikelets* in pairs 3- to 5-flowered, spreading; *glumes* lanceolate, somewhat twisted, broadened above the base, scabrous on veins and margins above the terete, indurated, slightly bowed-out, pale yellow base, with 2–5 strong nerves, awns 4–10 mm. long; *lemmas* minutely scabrous along veins near the apex, 5 veins distinct only near the apex, awns straight and scabrous; *paleas* blunt at apex, ciliate-hirsute near the apex; found in both flowering and fruiting stages in July.

Dimensions of various organs (all measurements based on 4 specimens):

Culm-length.....	70–90 cm.	Lemma-length.....	14–25 mm.
Culm-width (approx.)..	0.2 cm.	Length of lemma-body...	7–8.5 mm.
Blade-length.....	13–20 cm.	Palea-length.....	6–7 mm.
Blade-width.....	0.7–1.0 cm.	Anther-length.....	2.8 mm.
Spike-length.....	7.5–15 cm.	Grain-length.....	5.0–5.4 mm.
Glume-length.....	14–23 mm.	Grain-width.....	1.7–1.8 mm.
Glume-width.....	0.8–1.4 mm.		

This variety has not been previously reported from Minnesota. It is apparently rare and has been collected in only three localities in the southern part of the state. It probably occurs only in alkali soil. Lake Shetek is definitely an alkali lake and French Lake is probably one, being in the alkali lake and pond area. The soil around Jordan is a gray glacial till derived from the western (alkali) part of the state.

We suspect that the Minnesota plant is not genetically related to the var. *halophilus* of the East but rather represents a parallel response to similar ecological conditions. Further study may well show that it is not worthy of varietal rank.

SPECIMENS EXAMINED: MINNESOTA: near Jordan, July, 1891, *Ballard 389* (2 sheets, somewhat intermediate with typical *E. virginicus*); Bull's Bluff, Lake Shetek, Murray Co., July 5, 1902, *Skinner 303<sup>1/2</sup>*; shore of French Lake, Windom, Cottonwood Co., July 12, 1938, *Moyle 3142*.

## 2. ELYMUS VILLOSUS

2a. *E. villosus* Muhl. ex Willd. (TYPICAL). *E. striatus* of many American authors, not Willd.—*Culms* densely tufted, erect or ascending; *sheaths* glabrous except for villous hairs on the in-rolled margins, lower sheaths often glaucous and densely villous;

*blades* flat, often glaucous, thin, scabrous on the margins and on the lower surface, villous on the upper surface; *spikes* long- or short-exserted or partially included, several rudimentary spikelets at the base represented by coarse hairs, rudimentary or empty glumes; *rachis-internodes* flattened, concave above the middle next to the spikelets, slightly winged above the middle, often a blunt ridge down the length of back, hirsute on the margins; *spikelets* in pairs, usually 2-flowered (upper one sterile); *glumes* stiff, subsetaceous and tapering into their awns, usually with 3 strong nerves, terete and very slightly bowed out at the base, entirely villous or villous at the base and hirsute above, awns straight, rigid, scabrous; *lemmas* rounded on the back, villous to hispid on upper part of the body and hispid to glabrate on lower part, 5 very weak nerves visible only near the apex, awns straight, scabrous; *paleas* obtuse and ciliate near the apex, ciliate on the margins of the upper half, a few appressed soft hairs on the face.

Dimensions of various organs (measurements of floral organs based on 8 specimens):

Culm-length.....	40-60 cm.	Lemma-length.....	23-34 mm.
Culm-width (approx.)..	0.15 cm.	Length of lemma-body...	6-7.5 mm.
Blade-length.....	10-20 cm.	Palea-length.....	5.5-6.5 mm.
Blade-width.....	0.6-0.8 cm.	Anther-length.....	1.6-4.0 mm.
Spike-length.....	6-13 cm.	Grain-length.....	5-6 mm.
Glume-length.....	13-23 mm.	Grain-width.....	1.5-1.6 mm.
Glume-width.....	0.3-0.7 mm.		

This species has been collected along lake-shores and rivers and also in dry woods, meadows and on hillsides. It is generally distributed in the central and southern parts of the state.

2b. *E. villosus* f. *arkansanus* (Scribn. & Ball) Fernald.—*E. arkansanus* Scribn. & Ball. This form is distinguished from the typical element of the species by the less pronounced pubescence of glumes and lemmas. It has scabrous *glumes* (nerves and margins) and sometimes in addition has a few short stiff hairs near the base; the *lemmas* are short-hispid to glabrate on upper part of the body and puberulent to glabrate on lower part. In no other morphologic feature could further distinction of the form be established. Observations are based on three specimens collected in Minnesota (*Sheldon 842, 976<sup>1/2</sup>* and *Moyle 2770*) and other specimens from bordering states, Iowa and North and South Dakota.

A study of a suite of out-of-state material indicates that the length and the amount of pubescence on the glumes vary independently of each other. The nature of the pubescence is consistent only in that the longest hairs are always at the apex.

## 3. ELYMUS CANADENSIS

3. *E. CANADENSIS* L. *E. philadelphicus* L.; *E. glaucifolius* Muhl. ex Willd., fragment of TYPE in Gray Herb.; *E. canadensis* var. *pendulus* Eaton & Wright; *E. canadensis* f. *crescendus* Ramaley, TYPE in Herb. UM, seen; *E. robustus* Scribn. & Smith, TYPE in U. S. National Herb., ISOTYPE in Gray Herb., fragment of TYPE seen; *E. brachystachys* Scribn. & Ball, ISOPARATYPE, *Rydberg 1174*, in Herb. UM, seen; *E. canadensis villosus* Bates, ISOTYPE in Herb. UM, seen; *E. robustus* var. *vestitus* Wiegand.

The numerous combinations based on the above basonyms have been purposely omitted.

*Culms* erect, tufted; *sheaths* glabrous or rarely villous; *blades* flat, long-tapering, narrowed toward the base, usually scabrous on both surfaces but less markedly so on the upper surface; *spikes* long- or short-exserted or sometimes partially included, definitely arching to rather erect, occasionally glaucous in varying degrees, often with one to several rudimentary spikelets below the inflorescence proper, the several lowest internodes of the rachis elongated with spikelets few-flowered, variable in denseness of inflorescence; *rachis internodes* slightly winged and sparsely hispid on margins above the middle; *spikelets* commonly 2 or 3 abreast, 3- to 5-flowered with uppermost floret often sterile; *glumes* occasionally glaucous in varying degrees, 3-, 5-, or 6-nerved almost to the narrowed base, nerves scabrous to hirsute, margins narrowly hyaline and microscopically serrulate; *lemmas* practically glabrate to scabrous, hispid, or villous, varying in degree from dense to very sparse, 5 nerves prominent above the middle of the body, awns scabrous and spreading, many curved or recurved especially in fruit (straight only before flowering); *paleas* blunt at the apex, ciliate-hispid at the apex and along upper margins of the keels, scattered and appressed hairs on the face.

Dimensions of various organs (measurements for floral organs based on 12 specimens):

Culm-length . . . . .	70-120 cm.	Glume-length . . . . .	14-35 mm.
Culm-width (approx.) . . . . .	0.35-0.5 cm.	Glume-width . . . . .	0.8-1.2 mm.
Blade-length . . . . .	17-40 cm.	Lemma-length . . . . .	32-53 mm.
Blade-width . . . . .	0.5-1.5 cm.	Length of lemma-body . . . . .	11-17 mm.
Spike-length . . . . .	11-30 cm.	Palea-length . . . . .	9.8-13 mm.
Length of rachis-inter- node (middle of spike) . . . . .	6-7 mm.	Anther-length . . . . .	3 mm.
Length of rachis-inter- node (base of spike) . . . . .	10-15 mm.	Grain-length . . . . .	5-7 mm.
		Grain-width . . . . .	1.4-1.6 mm.

Material identifiable with each of the described entities cited in synonymy occurs in Minnesota. In the material we have seen,

however, the characters used to separate the entities vary considerably so that it is very difficult to draw lines of separation. In addition, no two characters correlate to any reasonable degree. About half of the Minnesota material is glaucous and the other half is green or very slightly glaucous. The spikes vary from rather erect to mostly definitely arching. Most spikes are exserted but some are included at the base. The spikes also vary from stout to slender and from long to short, without correlation between the two sets of characters. Any type of spike may be loosely or densely flowered. The sheaths and upper leaf-surfaces are rarely villous, commonly glabrous. The lemmas vary from glabrous to villous with all intermediate conditions represented; the abundance of hairs also varies greatly and without reference to their individual lengths. The variation with the villous sheaths and upper leaf-surfaces (*E. canadensis villosus* Bates) is more strongly marked than any of the others.

Taking seven pairs of the characters listed above (e. g., plant green vs. glaucous, spike erect vs. arching, etc.), there would be one hundred and twenty-eight possible combinations of characters. Of these, forty combinations occur in the fifty-eight sheets of *E. canadensis* examined.

Because of this independent behavior of the characters, we are unable to recognize any varieties within the species, and, although some variations may be worthy of the rank of form, we feel that the recognition of subspecific categories should await a broad study of all North American material.

Material very similar to ISOTYPES of *E. Wiegandii* Fernald and *E. Wiegandii* f. *calvescens* Fernald (*Fernald 197* and *Fernald & Strong in 1896*, respectively) has been collected in Minnesota: *Butters & Abbe 1024*, *E. & H. Alsapa in 1940*, and *Nielsen 1790*. We are unable to separate this material from *E. canadensis*. In their relatively narrow glumes, these specimens approach some specimens of the *E. canadensis* × *Hystrix patula* complex from which they may be separated by the equal and narrowly lanceolate glumes, rather than unequal or subsetaceous glumes.

*E. canadensis* is widely distributed throughout the state on lake-shores, river-banks, borders of woodlands along roadsides and railroads and elsewhere in light soils.



## 4. ELYMUS CANADENSIS × HYSTRIX PATULA

4. *E. CANADENSIS* L. × *H. PATULA* Moench. *E. diversiglumis* Scribn. & Ball, in part. *E. interruptus* of recent authors, in part, not Buckley.—*Culms* erect, rather stout; *sheaths* glabrous; *blades* flat, more or less scabrous on both surfaces, usually with scattered soft hairs on the upper surface; *spikes* loose, flexuous, mostly well exerted, usually with several rudimentary spikelets at the base, one specimen branched near the base; *rachis-internodes* slender, about 7 mm. long near the middle of the spike, much elongated near the base of the spike, narrowly winged and hirsute on margins above the middle, glabrous on the back; *spikelets* in pairs, somewhat spreading, deciduous, 3- to 5-flowered with uppermost floret usually empty; *glumes* one or more at a node, usually much reduced, spreading, scabrous to hispidulous on veins and margin, slightly bowed out and indurated at the base, setaceous to narrowly lanceolate; *lemmas* rounded on the back, hirsute to villous, 5 nerves distinct toward the apex, awns scabrous, curved; *paleas* prominently keeled at the sides, apex blunt, ciliate-hirsute along the rigid keels and at the apex, scattered and appressed hairs on the face near the apex.

Dimensions of various organs (measurements of floral organs based on 5 specimens):

Culm-length . . . . .	85–125 cm.	Lemma-length . . . . .	39–50 mm.
Culm-width (approx.) . . . . .	0.3 cm.	Length of lemma-body . . . . .	9.8–11 mm.
Blade-length . . . . .	15–30 cm.	Palea-length . . . . .	8.4–9.8 mm.
Blade-width . . . . .	0.7–1.1 cm.	Anther-length . . . . .	3.6–4.0 mm.
Spike-length . . . . .	13–24 cm.	Grain-length . . . . .	2.8–8.0 mm.
Glume-length . . . . .	6–20 mm.	} often much reduced in occasional glumes.	
Glume-width . . . . .	0.3–0.4 mm.		

The following table shows the intermediate nature of the proposed hybrid:

	<i>Elymus canadensis</i>	×	<i>Hystrix patula</i>
Lemma-awns	Curved-divergent, usually recurved	Curved-divergent, often recurved	Usually straight, not recurved
Glumes, shape	Narrowly to long-lanceolate	Setaceous to narrowly lanceolate, mostly subsetaceous	Setaceous if present
Glumes, length	14–35 mm., usually 25–30 mm.	6–20 mm., mostly 10–15 mm.	0–18 mm., mostly less than 5 mm.
Glumes, equality	Equal or essentially so	Unequal	Very unequal
Grains	Present	Often lacking	Present

The specimens collected in Minnesota and previously referred to *E. diversiglumis* and more recently to *E. interruptus* are unique

in the variable lengths of their glumes. An unusual amount of variation is often exhibited within a single spike. An intensive study has convinced us that this material represents hybrids of the proposed parent species. Unlike recent hybrids in the *Hordeae* studied by Stebbins and co-workers<sup>3</sup>, this one is apparently sometimes fertile, as indicated by the fact that rarely grains are developed. Such a complete series of intergrades exists between the two parents that it is likely also that there occurs considerable backcrossing of the presumed F<sub>1</sub> hybrids to the putative parents. The true nature of the proposed hybrid will, of course, await cytological and genetical studies.

The following selected series illustrates the transition between *Hystrix patula* and *Elymus canadensis* in the characters of the glumes: *Lakela 4183*, *H. patula*, has the glumes obsolete or rudimentary, only one of a pair developed to any size; *Sheldon 459*, *H. patula*, has the glumes obsolete to 8 mm. long with only one of a pair well developed; *Sandberg* (UM Herb. 67146), *H. patula*, has the glumes obsolete to 18 mm. long, those of a spikelet very unequal; *Bergman 2066* (N. Dakota), *Skinner & MacMillan 107*, *Ballard 578* and *Campbell 130*, *E. canadensis* × *H. patula*, have the glumes varying from obsolete to 8 mm. long and very unequal to mostly 4–15 mm. long and unequal. In all of the above specimens the glumes are setaceous. *Skinner & MacMillan 267* and *Grant 3091*, *E. canadensis* × *H. patula*, and *Rosendahl 4916* (Wis.), very close to *E. canadensis*, have the glumes subsetaceous to narrowly lanceolate, 6–20 mm. long and not very unequal; *Aiton in 1889* (UM Herb. 64790), *E. canadensis*, has the glumes equal, long-lanceolate and about 30 mm. long.

Specimens that are close to *E. canadensis* can usually be separated by their subsetaceous, relatively short glumes that are unequal in at least some of the spikelets. Those close to *Hystrix patula* can be separated by their relatively well developed glumes and the frequently recurved lemma awns.

The type specimens of *E. diversiglumis* (Wyoming) and *E. interruptus* (Texas) are from areas outside of the range of *Hystrix patula*. The status and identity of those two species is left for consideration in a broader study.

SPECIMENS EXAMINED: NORTH DAKOTA: Walhalla, *Bergman 2066*. SOUTH DAKOTA: Big Stone City, *J. W. Moore*

<sup>3</sup> STEBBINS, G. L., JR., J. I. VALENCIA and R. M. VALENCIA. Artificial and Natural Hybrids in the Gramineae, Tribe *Hordeae*. I. *Elymus*, *Sitanion* and *Agropyron*. Amer. Journ. Bot. 33: 338–351; II. *Agropyron*, *Elymus* and *Hordeum*. 579–586. 1946.

528. MINNESOTA: Crookston, *Skinner & MacMillan* 107, 267; Crystal Lake, *Ballard* 578; Rockville, *Campbell* 130; Vining, *Moore & Jacobs* 14777; Black Hoof, *Moore & Butters* 13472; Itasca Park, *Grant* 2914, 3091, 3138; Lanesboro, *Moyle* 3959; St. Anthony Park (St. Paul), *Wheeler* 1224; Itasca Park, *Rosendahl* 5917, 5922; Gull Lake, *A. P. Anderson in 1893*; Nerstrand Woods, *Linnaean Club* 210; Fort Snelling, *Nielsen* 1785. WISCONSIN: St. Croix Co. (north of Stillwater, Minn.), *Rosendahl* 4916.

This hybrid is rather widely distributed from the southeastern corner of the state to nearly the northwest corner, but has not been collected in either the southwestern or northeastern parts of Minnesota. It occurs entirely within the range of *Hystrix patula* in the state.

### 5. "ELYMUS MACOUNII"

5. AGROPYRON TRACHYCAULUM (Link) Malte var. TYPICUM Fernald × HORDEUM JUBATUM L. *Elymus Macounii* Vasey.

The "species" long passing as *Elymus Macounii* has recently been shown<sup>4</sup> to represent hybrids of various species of *Agropyron* and *Hordeum*. The material from Minnesota is all sterile, lacking grains, and it fits into such a hybrid interpretation. The parents of the Minnesota material (*Wheeler* 1254, *Skinner* 223, *Ballard* 2570 and *Moyle* 2609) are proposed as *A. trachycaulum* var. *typicum* and *H. jubatum*. The critical characters of the two parents and the hybrid are presented in the following table:

<i>Hordeum jubatum</i>	×	<i>Agropyron trachycaulum</i> var. <i>typicum</i>
Rachis readily disarticulating	Rachis tardily and incompletely disarticulating	Rachis tardily and weakly, if at all, disarticulating
Spikelets in 3's	Spikelets solitary or in pairs	Spikelets solitary
Spikelets 1-flowered	Spikelets 2-4-flowered	Spikelets 3-4-flowered
Spikelets spreading	Spikelets appressed	Spikelets appressed
Glume-awns 4-8 cm. long	Glume-awns 0.5-1 cm. long	Glumes awnless or nearly so
Grains present	Grains absent	Grains present

### 6. EXCLUDED SPECIES: ELYMUS CINEREUS

6. E. CINEREUS Scribn. & Merr. *E. condensatus* of recent authors, in part, not Presl.

<sup>4</sup> STEBBINS, G. L., JR., J. I. VALENCIA and R. M. VALENCIA. Artificial and Natural Hybrids in the Gramineae, tribe *Hordeae* II. *Agropyron*, *Elymus* and *Hordeum*. Amer. Journ. Bot. 33: 580. 1946.

The awnless or scarcely awned lemmas separate this species from *E. canadensis* and *E. villosus* and the setaceous or subsetaceous glumes separate it from *E. virginicus*.

This species is known to Minnesota only by a single specimen in the United States National Herbarium (Fort Snelling, Minnesota, August 3, 1890, *E. A. Mearns 4*). The identification has been confirmed by Dr. J. R. Swallen who has also kindly sent us a copy of the label. A mixture of labels may have been involved (Vasey's identification was *E. canadensis* !), but assuming not, then it seems almost certain that this species no longer grows at Fort Snelling. Local botanists have never collected the species there in spite of frequent trips to the area, even in the 1890's. Intensive development of the area during two wars has eradicated much of the original flora. Inasmuch as the Minnesota "station" is an isolated eastern occurrence, there is the possibility that it was an ephemeral adventive from the West.

Under the circumstances, we feel that it is best to exclude this species from the state flora until such a time as its occurrence may be more satisfactorily established.

DEPARTMENT OF BOTANY,  
UNIVERSITY OF MINNESOTA

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## DISTRIBUTIONAL NOTES AND SOME MINOR FORMS FROM OKLAHOMA

U. T. WATERFALL

The following notes are concerned primarily with plants collected by the author in 1944 and 1945, mostly in south-central Oklahoma in the Arbuckle Mountains and vicinity. This area has often been botanically investigated by classes, and other parties, but has seldom been reported on as a phytogeographic area. Ernest J. Palmer spent parts of two days collecting there in 1934 while on a more extensive botanizing trip which included other parts of the state. In the Arbuckles he found and reported several species which he considered to be characteristic of the limestone areas of the Edwards Plateau in Texas. He suggested that the Arbucklean flora might constitute a northeastern